

Standard PS-6: The student will demonstrate an understanding of the nature, conservation, and transformation of energy.

Supporting Content Web Sites

The Kavli Operating Institute, NSF

<http://www.colorado.edu/physics/phet/web-pages/index.html>

This site has fun, interactive simulations of physical phenomena that make bridges to the real world, from the Physics Education Technology project at the University of Colorado.
PS-6.6-6.8

The Physics Classroom

<http://www.physicsclassroom.com/>

The tutorial on work, power and energy is excellent. Contents are well covered.
PS-6.1-6.4

The School for Champions

<http://www.school-for-champions.com/science.htm>

The site offers much on PS-6 and is very good for 6.5-6.11. There is much content on electricity as well as experiments.
PS-6.5-6.11

Associated Chemistry Teachers of Texas

http://www.statweb.org/ACT2/labs_demos.htm

In the Doing Science: Introduction to Physical Science, Chapters 5 and 6 are excellent for static electricity.
PS-6.5

Experiments by Exploration, Arizona State University

<http://accept.la.asu.edu/courses/phs110/expmts/toc.html>

The site is good for physics activities. There are energy stations as well as electricity and magnetism activities. There are many simple activities.
PS6.1 and 6.6-6.9

Exploratorium

<http://www.exploratorium.edu/snacks/iconoelectricity.html>

This site has some neat activities on electricity including making an electroscope and a motor. PS 6.5 and 6.11.

bbc.co.uk

<http://www.bbc.co.uk/scotland/education/bitesize/standard/physics/electricity/index.shtml>

The site is interactive, can be easily printed and has many problems on a variety of topics. It is great for electricity and also for work and energy. Indicators, PS-6.1-6.4 as well as 6.6-6.11, are covered.

PS-6.1-6-4, 6.6-6.11

DCMST Dearborn Public Schools

www.physicslessons.com

The site has superb graphics and offers an on-line stopwatch, calculator, graph paper and much more!!! See Demos, MicroLabs and Q Physics.

PS-6.5-6.11

The Science Spot Kids Zone

<http://www.sciencespot.net/Pages/kdzphysics3.html>

This excellent site covers electricity and magnetism. It uses Shockwave and is very interactive.

PS-6.5-6.11

North Carolina State University

<http://www.physics.ncsu.edu/pira/demosite.html>

This site gives a list of online Physics Demonstration Manuals and related physics resources with more than 30 college site links. All of PS-6 demos is somewhere on this site.

PS-6.1-6.10

Suggested Literature

Gunderson P. Erik (1999) The Handy Physics Answer Book Visible Ink Press

ISBN 0.7808.0723-5

Lexile Level - NA

A useful resource for all sorts of questions about gravity, magnetism, matter and energy. It provides surprisingly simple answers to questions about why things are the way they are.

PS-6.1

Taylor, B. (2005). Teaching Physics With TOYS. Easy Guide Edition with CD-Rpm.

Middletown, OH: Terrific Science Press

ISBN: 1-883822408

Lexile Level – NA

This revised edition encourages students to explore physics using toys. This package contains excellent information, material, and activities useful to teachers at many levels.

PS-6.1-6.3

Taylor, B. (1997) Exploring Energy with TOYS. McGraw-Hill ISBN: 0-07-064747-X

Lexile Level – NA

Energy concepts are illustrated with inexpensive toys. All activities are linked to National Standards.

PS-6.1-3, 9.9, 6.11

Bloomfield, Louis A. (2007) How Everything Works: Making Physics out of the Ordinary

ISBN 0-471-74817-X

Lexile Level - NA

This book explains the physics of everyday life, and explains the real scientific foundation behind what it explores. The reader will discover that science is truly part of your everyday world.

PS-6

DiSpezio, M. (1998). Awesome Experiments in Electricity and Magnetism. New York: Sterling ISBN: 0-8069-9819-9

Lexile Level - NA

Seventy-two brief activities through which a student can explore the basic concepts of electricity and magnetism are compiled. The three sections include static electricity, current electricity, and magnets and magnetism.

PS-6.5-6.11

Cunning, J. (1994) Hands-On Physics Activities with Real-Life Applications. West Nyack, NY: Center for Applied Research

ISBN: 0-87628-845-X

Lexile Level – NA

This book provides extensive physics activities with real-life applications. The activities use common materials and are simple to perform.

PS-6.1-6-11

Kakalios, James (2005) Physics of Superheroes. Penguin Books, New York, NY

ISBN 1592401465

Lexile Level - NA

This book tackles some of the achievements of modern superheroes like Superman and Spiderman and relates them to physics in such a way that anyone can understand.

PS-6

Tymony, Cy (2003) Sneaky Uses for Everyday Things. Andrews McMeel

ISBN: 0-7407-3859-3

Lexile Level - NA

Sneaky uses for everyday things – extract water and electricity from thin air, how to turn a penny into a radio and other amazing feats.

PS-6

Beller, Joe and Magliore, Kim (2000) Hands-On Science Series: Electricity and Magnetism Walch Publishing Company, ME

ISBN 0-8251-3933-3

Lexile Level - NA

A collection of activities many of which designed for out-of-class involvement as well as team projects.

PS-6

Adams, Richard. 2000. Physics Projects for Young Scientists. New York, Franklin Watts, ISBNQC33.P48 2000

Lexile Level - NA

The book breaks down real world experiences while bringing in the physics. Provides ways to expand the projects to be more in depth.

PS-6

Gonick, Larry (1992) The Cartoon Guide to Physics. Harper Collins Publishers, NY ISBN 0062731009

As the jacket copy says, "If you think a negative charge is something that shows up on your credit-card bill--if you imagine that Ohm's law dictates how long to meditate--if you believe that Newtonian mechanics will fix your car," here's the book for you.

All of PS-6

Suggested Streamline Video Resources

Basics of Physics: Exploring Energy

ETV Streamline SC

This program starts with an exploration of potential and kinetic energy and moves into a discussion of the main forms of energy.

Examples of Energy (1:08)

Work, Force and Energy (1:14)

Potential and Kinetic Energy (2:07)

Seven Forms of Energy (5:05)

Law of Conservation of Energy (4:35)

PS-6.1-6.4

Elements of Physics: Energy: Work and Power

ETV Streamline SC

Forms of energy, conversion from one form to another and work are explained.

An Introduction to Energy and Work (0:50)

Energy as Work (1:21)

Kinetic and Potential Energy (2:10)

PS-6.2, 6.3

Matter and Energy: Energy: What Is It?

ETV Streamline SC

Energy is defined. Potential and kinetic energy are described, as well as the Law of Conservation of Energy.

Energy at Work: How Do We Define It? (1:18)

The Scientific Definition of Work (1:14)

Two Types of Energy (1:21)

Forms of Energy (1:03)

How Energy Is Used (3:56)

Summary (0:49) PS-6.1 – 6.4

Electricity and Magnetism

ETV Streamline SC

This program is about magnetism and its relationship to electricity.

ABC's of Magnets (5:52)

What Makes Certain Materials Magnetic? (1:47)

Electromagnets (2:32)

Electricity From Magnetism (1:45)

Maglev (2:12)

PS-6.10, 6.11

Electricity and Magnetism: Measuring and using Electricity

ETV Streamline SC

Current, wattage, voltage and amperage are all terms used to describe and measure electricity.

Electrical Current (0:39)

Electricity and Magnetism : Static Electricity

ETV Streamline SC

PS-6.6

Electricity and Magnetism: Current Electricity

ETV Streamline SC

Current electricity is featured in this video.

Current Electricity: Circuits, Conductors and Insulators (4:30)

Series and Parallel (2:02)

PS-6.8, 6.9

Static electricity is the focus of this video

Static and Current Electricity (1:35)

Balloons on Wall (1:05)

Lightning (3:11)

Electric Transfer (2:58)

Van de Graaf Generator (6:33)

PS-6.5

Physical Science: Magnetism

ETV Streamline SC

Magnetism is introduced and magnetic fields are discussed.

Introduction to Magnetism (3:41)

Electromagnetism (2:58)

PS-6.11

Understanding Magnetism

ETV Streamline SC

The role of magnetism in our world is shown and Maglev trains are explained.

Linking Electricity and Magnetism (6:17)

Using Magnetism to Fly (2:33)

PS-6.11

Physics: A World in Motion: Ohm's Law and Energy

ETV Streamline SC

Ohm's Law is used to explain electrical safety.

Program Overview (1:04)

Resistance (4:12)

Ohm's Law (6:17)

Suggested for Honors or High Level

Electric Safety (5:05)

Suggested for Honors or High Level

PS-6.6

Career Connections

Physics Teacher – Teachers can experience the excitement and pleasure of educating others about the fields of physics. PS-6.1-6.11 embodies concepts which are essential to the understanding of physics.

Chemical physicist – studies the connections between chemistry and physics. This area is important for the development of fuels and alternate energy sources, a major component of PS-6.

Solid state physicist – studies the physics and application of the electric, magnetic, optical and acoustic properties of solid matter. Integrated circuits are the result of solid state physics. PS-6 incorporates these basic principles.

Engineer – works with a wide variety of materials such as coatings, glass fibers, equipment development, design and research. All engineers must require an understanding of the basic concepts in PS-6.

Medical physicist – studies and applies physics to medical practice, including uses of radiation, ultrasound and imaging techniques such as magnetic resonance imaging (MRI). PS-6 provides background for these important concepts.

Nuclear physicist – studies the nucleus of the atom, its radioactivity (including medical applications) and nuclear energy. The nuclear physicist works with accelerators and nuclear reactors, a major energy source which is an integral part of concepts taught in PS-6.

Auto Mechanic – works with engines of all types and must understand the transformations of energy that take place in motors and other components of automobiles, airplanes and other forms of transportation. PS-6 deals with such transformations of energy.

Acoustical physicist – studies sound, an evermore increasingly important form of energy. This knowledge can be applied in the design of such things as concert halls, stereos or synthesizers. Energy transformations are an important part of PS-6.

Laboratory technologist – work with physicists and engineers to develop, test and develop new products, operate specialized equipment and perform tests of materials and equipment. A good understanding of the principles presented in PS-6 is essential for a technician.

Electrician – wires buildings, works with architects to ensure a safe environment and is required to have a good understanding of all facets of electricity as found in PS -6.

Metallurgist – research and produce very powerful magnets. The study of magnetism is an essential component of PS-6.